NEW CLAIMS

61. A remote sound detector for detecting a hidden source of acoustic signals, comprising:

a) a transmitter including a laser source operably arranged for producing a laser beam, and a modulator for modulating the laser beam to produce a train of pulse to pulse coherent signals, and the transmitter being operable for transmitting the signals as a beam into a region of atmosphere which is located above the hidden source of the acoustic signals;

b) a receiver operably arranged for receiving resultant signals from an intersection of the beam with the acoustic signals in the region of atmosphere;

c) an interferometer operably arranged for providing an interference pattern between the laser beam and each resultant signal;

d) a detector including a photoreceiver operably arranged for detecting and producing an output signal corresponding to changes in each interference pattern, and operably connected to the receiver and arranged for determining a presence of the hidden source of the acoustic signals from a phase difference between successive resultant signals; and

e) a sampler operably arranged for sampling the output signals from the photoreceiver, and a comparator operably arranged for comparing the output signals from immediate successive pairs of outputs from the photoreceiver to produce a result.

62. The remote sound detector of claim 61, wherein an accumulator is operably arranged for accumulating each result.

63. The remote sound detector of claim 61, wherein a loudspeaker is operably arranged for reproducing audible output of the result.

64. The remote sound detector of claim 61, wherein the sampler is operably arranged for sampling the output signals from the photoreceiver at different ranges to the hidden source, and a processor is arranged for determining a curvature of an acoustic signal wavefront from the hidden source, for determining a first circle from the wavefront substantially perpendicular to the beam which intersects the acoustic signals, for calculating a second circle as for the first circle with the beam directed to a different range, and for locating the hidden source of the acoustic signals as the point that the first and second circles join.

65. A method of remote sound detecting a hidden source of acoustic signals, comprising the steps of:

a) producing and modulating a laser beam to produce a train of pulse to pulse coherent signals, and transmitting the train of signals as a beam into a region of atmosphere which is located above the hidden source of the acoustic signals;

b) receiving resultant signals from an intersection of the beam with the acoustic signals in the region of atmosphere;

c) providing an interference pattern between the laser beam and each resultant signal;

d) detecting and producing an output signal corresponding to changes between each interference pattern;

e) determining a presence of the hidden source of the acoustic signals from a phase difference between successive resultant signals; and

f) sampling the output signal, comparing the output signals from immediate successive pairs of the output signals, and producing a result.

66. The method of claim 65, including accumulating each result.

67. The method of claim 65, including providing an audible output of the result.

68. The method of claim 65, wherein the sampling of the output signal is performed at different ranges to the hidden source, and the steps of determining a curvature of an acoustic signal wavefront from the hidden source, determining a first circle from the wavefront substantially perpendicular to the beam which intersects the acoustic signals, calculating a second circle as for the first circle with the beam directed to a different range, and locating the hidden source of the acoustic signals as the point that the first and second circles join.